BY ORDER OF THE
SECRETARY OF THE AIR FORCE

AIR FORCE HANDBOOK 63-1402

19 MARCH 2001

Acquisition

AIRCRAFT INFORMATION PROGRAM

NOTICE: This publication is available digitally on the AFDPO/PP WWW site at: **http://afpubs.hq.af.mil.**

OPR: HQ AFSC/SEF (Mr. Everett Smith) Certified by: AF/SE (Maj. Gen. Timothy A. Peppe)
Pages: 56
Distribution: F

This handbook assists in the establishment of Aircraft Information Programs and provides guidance in selecting recording parameters and functional requirements for information collection systems.

Report Documentation Page

Report Date	Report Type	Dates Covered (from... to)
19032001	N/A	-

Title and Subtitle Aircraft Information Program Air Force Handbook 63-1402	**Contract Number**
	Grant Number
	Program Element Number
Author(s)	**Project Number**
	Task Number
	Work Unit Number
Performing Organization Name(s) and Address(es) Secretary of The Air Force The Pentagon Washington, DC	**Performing Organization Report Number**
Sponsoring/Monitoring Agency Name(s) and Address(es)	**Sponsor/Monitor's Acronym(s)**
	Sponsor/Monitor's Report Number(s)

Distribution/Availability Statement
Approved for public release, distribution unlimited

Supplementary Notes

Abstract

Subject Terms

Report Classification unclassified	**Classification of this page** unclassified
Classification of Abstract unclassified	**Limitation of Abstract** UU

Number of Pages
56

1. Introduction

1.1. The Aircraft Information Program (AIP) supports mishap investigations, Flight Operational Quality Assurance (FOQA), Reliability Centered Maintenance (RCM), Aircraft and Engine Structural Integrity Programs (ASIP/ENSIP), aircraft development programs and training. Its primary goal is to balance information needs with program resources and operational considerations. This handbook provides guidance in selecting the appropriate recording parameters and functional requirements for information collection systems.

1.2. Mishap investigations are relatively straightforward processes where causes and contributing factors are determined and used to produce a list of recommendations that should prevent future mishaps. However, many investigations are inconclusive due to lack of evidence to support mishap scenarios. This allows insidious conditions to persist and cause future mishaps.

2. Program Goals

2.1. Institutionalize Mishap Investigative Information Requirements

2.1.1. Voice and data recorders for mishap information collection have traditionally lacked advocates in the operational and acquisition communities.

2.1.2. Standing policy requiring Flight Data Recorders (FDRs) was issued in 1973. Lessons Learned since that time have illustrated the need to institutionalize a process requiring the explicit addressing of investigative information data gathering needs.

2.1.3. Numerous customers exist for recorded aircraft information. Training and mishap investigation are two obvious reasons to record the performance of the aircraft and crew. Industry has pioneered the use of such information in a proactive mode. A FOQA program examines non-mishap flight data in a non-attribution basis to identify hazardous flight procedures and environments.

2.1.4. The engine and structural communities have been performing RCM for many years. The utility of predicting component wearout or imminent failure has resulted in extensive cost savings. The ability to remove or repair on an as needed basis versus scheduled intervals has saved costs and circumvented component failures leading to mishaps.

2.2. Improve Quality of Mishap Investigation and Reporting

2.2.1. The Air Force forms boards to investigate and determine the cause(s) of mishaps. While many mishaps are straightforward and benefit from surviving crew testimony, the majority requires extensive analysis, test and simulation. With modern aircraft employing electronic control systems and video displays, some physical evidence no longer exists at the mishap scene.

2.2.2. Those aircraft with crash survivable data recorders have demonstrated more conclusive investigations than those without recorders. This allows the board to spend less time determining what occurred and more time determining why a mishap occurred.

2.3. Enable FOQA and RCM Programs

2.3.1. Commercial aviation has pioneered the use of “non-mishap” data to detect hazardous operational trends. Examples of such trends would include excessive bank angles, hard landings, and unstabilized approaches. In general, looking for any trigger that would focus attention on a hazardous situation.

2.3.2. The implementation of a FOQA program presents a number of challenges. One hotly debated topic is the potential use of FOQA data for punitive action. The identity of the crew must be stripped from the data within a short time span and at the lowest organizational level feasible. Consequently, pre-processing of the data must be accomplished in a timely manner to allow interviewing the crew for clarification of unique data trends. Flight crew acceptance of FOQA as a non-punitive program is a fundamental building block that cannot be compromised.

2.3.3. Another FOQA challenge is the sheer volume of collected information. Ground support software requires specific "triggers" to analyze the recorded data and detect hazardous conditions. These suspect records then require closer human evaluation to validate the concern of the expert system.

2.3.4. Commercial aviation includes equipment monitoring and trending in its definition of FOQA while the Air Force refers to it as Reliability Centered-Maintenance (RCM). In any event, it has been shown in both government and industry that impressive cost savings can be accomplished. Whether it's extending the removal interval of engines, or detecting excessive fuel consumption due to flight control misrigging, both safety and cost avoidance are accomplished.

2.4. Assure Integrated Solution

2.4.1. There are many sources of information on an aircraft. Modern aircraft systems have digital databuses with volumes of parametric data readily available for recorders. Cockpit Voice Recorders are on many aircraft capturing valuable acoustic information. Training needs often result in Heads-Up-Display (HUD) and Multi-Function Display (MFD) video recorders.

2.4.2. Future weapon systems may have separate acoustic, video and parametric information sources or achieve optimizations through integration of the technologies. Analyzing the total system requirements will provide the best and lowest cost solution to the program.

2.5. Enhance Training Effectiveness

2.5.1. Videotapes of Heads-Up-Display (HUD) and Multi-Function Display (MFD) images are currently used in crew training. The tapes occasionally survive crash dynamics and contribute to board investigations. Emerging recording system technologies are capable of integrating acoustic, image and parametric information into crash survivable packages.

2.5.2. Integration of these information sources coupled with real time simulators will provide higher fidelity training opportunities.

2.6. Assist new aircraft development programs.

2.6.1. Identification of information customers should occur prior to the Engineering, Manufacturing and Development phase of a program. Early identification will result in the most cost effective and integrated solution for the program. Establish the AIWG early to assist in specification of requirements.

3. Standardization

3.1. Mishap investigators ascertain the cause of an accident by determining the state of the aircraft, the environment in which it was operating, and the actions of the crew that led up to the event.

3.2. Early recorders were designed to capture the fundamental parameters of altitude, heading, airspeed and vertical acceleration. These parameters enabled the investigator to recreate the flight path

of the air vehicle and then postulate what subsystem failures or crew actions would result in such a flight profile. These postulations along with other evidence were used by the investigator to conduct analyses and arrive at a cause of the mishap.

3.3. These fundamental parameters were selected in an environment where parameter recording was not as simple an endeavor as it is today. Designing a recording system that would both record parameters to sufficient resolution and survive an impact was no small feat in the 1950's. However, as more resources were put to the task and technology advanced it became feasible to increase both the duration and number of parameters recorded.

3.4. The next generation of parameters added pitch attitude, roll attitude, longitudinal acceleration, pitch trim and engine thrust. These new parameters added to the accuracy of determining aircraft dynamics and most probable crew actions. The requirement to record either control column displacement or pitch control surface position was also added at this time to help distinguish when aircraft dynamics were directly attributable to crew action or subsystem failure.

3.5. The next expansion of recorded parameters included most crew control inputs and control surface positions thereby clearly distinguishing between crew commanded maneuvers and aircraft failures.

3.6. With the proliferation of digital data buses and computer technology it is now possible to record hundreds of parameters for many hours. Modern military aircraft demonstrate this ability by recording a plethora of information. Consequently, one of the challenges now becomes assuring critical parameters are captured in crash survivable media and not overlooked while identifying parameters used for other purposes.

3.7. The National Transportation Safety Board (NTSB), the European Organization for Civil Aviation Equipment (EUROCAE) and the U.S. military services have periodically recommended specific parameters for mishap investigation. Many of these parameters have subsequently been required to be recorded as a minimum allowable set by various worldwide regulatory agencies such as the FAA and Joint Aviation Authority (JAA).

3.8. Tables 1 and 2 reflect an extensive list of parameters available for recording on both aircraft and helicopters, respectively. These parameters are essential to either investigative or preventative maintenance efforts. While the list is extensive, there will always be "just one more" parameter that could be captured. Additionally, military aircraft may have mission specific or special equipment status that could also be recorded. So while the list appears complete, mission needs and requirements may dictate a more extensive list when deciding on data recording requirements.

3.9. Parameters listed in Tables 1 and 2 are categorized further based on their importance to the investigative and mishap prevention process. Category 1 and 2 data satisfy the Chief of Staff directive that requires a standard set of Digital Flight Data Recorder parameters for inclusion in existing and planned future weapon systems.

3.10. Performance and functional requirements for information recording systems should be determined by exhaustive review of current industry standards and mishap lessons learned. FAA Technical Standard Orders (TSOs) such as C-124a and C-123a should be consulted. International standardization efforts by EUROCAE and International Civil Aviation Organization (ICAO) should be reviewed along with recommendations of the NTSB and USAF Safety Center. The USAF Safety Center will be able to provide the latest standards and USAF positions relative to these standards.

3.11. Federal Aviation Regulation (FAR) 25.1457, Cockpit Voice Recorders and FAR 25.1459, Flight Data Recorders should be reviewed by the AIWG for the applicability to each program.

4. AIWG Formation. Each aircraft program will establish an Aircraft Information Working Group (AIWG). The purpose of the AIWG is to ensure that decisions affecting aircraft system capabilities account for information needs of the operational, maintenance and safety communities.

4.1. The program manager/director or his designated representative will chair the AIWG and oversee the writing of its charter and the Aircraft Information Management Plan (AIMP). The AIWG chair will solicit appropriate members and advisors in accordance with the guidance of AFI 63-1401. The AIWG shall assure the members and advisors are empowered to represent their organization and sufficiently trained and experienced in the subject matter to contribute positively.

4.2. Membership of the AIWG shall consist of the following individuals whose roles and responsibilities are defined in AFI 63-1401.

The chairman

The Chief Engineer or representative

Representatives from the lead command to address operational, logistical and maintenance issues.

Representative from the Air Force Safety Center

4.3. The AIWG will determine the appropriate inspection period for validating the quality and functionality of all AIP components.

5. Aircraft Information Management Plan

5.1. The AIMP will address all information needs of the subject aircraft. All forms of information regardless of recording media or transmission method will be considered.

5.2. Acoustic, imagery, datalink, and parametric information shall be considered when arriving at an integrated solution for the program.

5.3. The AIWG will advise when the AIMP is required and draft the document for Program Management approval.

6. Parameter Selection Process.

6.1. To record all possible information on every aircraft would be both cost prohibitive and unrealistic. However, a balance must be struck between optimization for the information customer and cost avoidance.

6.2. Even though the USAF participates in many commercial standardization efforts we seldom have sufficient influence to require parameters that could be viewed as military unique. Parameter tables 1.0 and 2.0 were specifically crafted for military aircraft from participation in international working groups, recommendations of the NTSB and military lessons learned. The parameter category reflects it's hierarchical importance and is described below. References to FAR and WG-50 numbers are solely provided as a tool to correlate AIP parameters to those recommended by national and international bodies.

1 – Required

2 – Required if electronic displays/glass cockpit otherwise, recommended

3 – Highly desirable if data stream accessible

4 – Recommended if readily available

6.3. Ability for the user to delete geographical, flight path, and performance information should be considered in the system design to address both wartime and peacetime security concerns. However, this ability must be validated by the customer of the information being deleted and provided only as unique operational requirements dictate. Sufficient safeguards against arbitrary and capricious deletion of information must be included in the system design.

Table 1. Fixed Wing Aircraft Parameters.

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
1.0 Recorder, System or Mission Parameters								
1.1 CVR/DFDR Synchronization Reference	1	-	8					
1.2 Microphone/ Transmitter Keying	1	8	8	Discrete(s)	1	-	-	Preferably each crew member but one discrete acceptable for all transmissions provided the CVR/FDR system complies with 1.1 of this table
1.3 Data Time Tag reference	-	-	-	-	-	-	-	-
1.3.1 Recorder Elapsed Time	1c	-	-					
1.3.2 Relative Time Count	1b	-	1b	0 to 4095	4	± 0.125% per hour	1 second	Counter increments each 4 seconds of system operation
1.3.3 UTC	1a	1	1a	24 hours	4	± 0.125% per hour	1 second	Preferred
1.4 Event Marker	1	-	76	Discrete	1	-		Cockpit Switch
1.5 Date	3	-	77	366 Days	Power On	-	1 Day	UTC Time Preferred Where Available
1.6 Aircraft Number	3	-	-	As Installed	Power On	-	-	
1.7 Departure Base	4	-	-	As Installed	Power On	-	-	
1.8 Aircraft Weight	4	-	-	As Installed	Power On			

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
2.0 Aircraft Dynamics								
2.1 Velocity	-	-	-	-	-	-	-	-
2.1.1 Indicated Airspeed (KIAS)	1	3	3	Minimum value from installed pitot static system to 1.2 V_{NE}	1	± 5%	1 kt (0.5 kt recommended)	Should be obtained from the air data computer where installed
2.1.2 Calibrated Airspeed (KCAS)	4	3	3	Minimum value from installed pitot static system to 1.2 VNE	1	± 3%	1 kt (0.5 kt recommended)	Should be obtained from the air data computer where installed
2.1.3 Groundspeed	4	34	31	As installed	1	Data should be obtained from the most accurate system	1 kt	-
2.1.4 Taxi Speed	4	-	-	As installed	1	Data should be obtained from the most accurate system	1 kt	Not required/recommended if Groundspeed (2.1.1.3) captures the data.
2.2 Attitude	-	-	-	-	-	-	-	-
2.2.1 Pitch Attitude	1	6	6	± 90 degrees	0.25	± 2 degrees	0.5 degree	Accuracy will apply within ± 75° range
2.2.2 Roll Attitude	1	7	7	± 180 degrees	0.5	± 2 degrees	0.5 degree	-
2.3 Accelerations	-	-	-	-	-	-	-	-
2.3.1 Linear Accelerations	-	-	-	-	-	-	-	-

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
2.3.1.1 Vertical/Normal Acceleration	1	5	5	±12g	0.125	± 1% of specified range excluding a datum error of ± 5% of specified range	0.004G	-
2.3.1.2 Lateral Acceleration	1	18	17	±2g	0.25	± 1.5% of specified range excluding datum error of ± 5% of specified range	0.004G	-
2.3.1.3 Longitudinal Acceleration	1	11	16	±3g	0.25	± 1.5% of specified range excluding datum error of ± 5% of specified range	0.004G	-
2.3.1.4 Thrust of Each Engine	1 (6.2.7)	9	9a	Full Range	Each engine each second	as installed	0.1 % of full range	Sufficient parameters must be recorded to determine power in both normal and reverse thrust. A margin for possible overspeed should be provided.
2.3.2 Angular Accelerations	-	-	-	-	-	-	-	-
2.3.2.1 Pitch Acceleration	4	-	-	As Installed	0.25	-	-	-
2.3.2.2 Roll Acceleration	4	-	-	As Installed	0.25	-	-	-
2.3.2.3 Yaw Acceleration	4	-	-	As Installed	0.25	-	-	-

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
2.4 Angles	-	-	-	-	-	-	-	-
2.4.1 Yaw (y) or Sideslip Angle (b)	3	70	68	Full range	1	± 5%	0.5 degree	-
2.4.2 Angle of Attack (a) Left & Right if available	3	32	29	As installed	0.5	As installed	0.3% of full range	If left and right sensors are available, each may be recorded at 1 second intervals so as to give interleaved data points each half second. If the aircraft is equipped with a suitable data source for this parameter the data must be recorded.
3.0 Aircraft Environment								
3.1 Altitude	-	-	-	-	-	-	-	-
3.1.1 Pressure Altitude	1	2	2	-1000 to maximum altitude of aircraft +5000 ft	1	± 100 ft to ± 700 ft	5 ft	Should be obtained from the air data computer where installed

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
3.1.2 Radio/Radar Altitude	3	26	20	-20 ft to +2500 ft	1	± 2 ft or ± 3% whichever is greater below 500 ft and ±5% above 500 ft recommended	1 ft below 500 ft, 1 ft + 0.5% of full range above 500 ft	For autoland/category 3 operations, each radio altimeter should be recorded, but arranged so that at least one is recorded each second. Radio altitude can go negative depending on aircraft attitude and sensor calibration
3.1.3 GPS Altitude	4	-	-	-1000 to maximum altitude of aircraft +5000 ft				
3.2 Geodetic Position (Lat/Long)	3	39	33d	As installed	4	Data should be obtained from the most accurate system as installed	0.002 degree	Where capacity permits, latitude/longitude resolution should be 0.0002 degree
3.3 Heading (Primary Crew Reference)	1	4	4	0-360° and discrete 'true' or 'mag'	1	± 2 degrees	0.5 degrees	When true or magnetic heading can be selected as the primary heading reference, a discrete indicating selection must be recorded
3.4 Airflow	-	-	-	-	-	-	-	-

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
3.4.1 WindDirection	3	38	33c	As installed	1	Data should be obtained from the most accurate system as installed	1 degree	-
3.4.2 Wind Speed	3	38	33b	As installed	1	Data should be obtained from the most accurate system as installed	1 knot	-
3.4.3 Drift Angle	3	37	33a	As installed	4	Data should be obtained from the most accurate system as installed	0.1 degree	-
3.5 Temperature	1	-	-	-	-	-	-	-
3.5.1 Outside Air Temperature	1b	24	14	-50°C to +90°C or available sensor range	2	± 2°C	0.3°C	-
3.5.2 Total Air Temperature	1a	24	14	-50°C to +90°C or available sensor range	2	± 2°C	0.3°C	-
4.0 Aircraft Aerodynamic Configuration								
4.1 Primary Control Surface Configurations	-	-	-	-	-	-	-	-

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
4.1.1 Pitch Axis Primary Control Surface Positions	1	15	18a	Full range	0.25	± 2 degrees unless higher accuracy uniquely required or available	0.2% of full range or the resolution required to operate the aircraft	-
4.1.2 Pitch Axis Trim Control Surface Positions	1 (or 5.4.1)	19	19	Full range	1	± 3% unless higher accuracy uniquely required or available	0.3% of full range or the resolution required to operate the aircraft	Where dual surfaces are provided it is permissable to record each surface alternately
4.1.3 Roll Axis Primary Control Surface Positions	1	16	18b	Full range	0.25	± 2 degrees unless higher accuracy uniquely required or available	0.2% of full range or the resolution required to operate the aircraft	-
4.1.4 Roll Axis Trim Control Surface Positions	1 (or 5.4.2)	67	67	Full range	2	± 3% unless higher accuracy uniquely required or available	0.3% of full range	-

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
4.1.5 Yaw Axis Primary Control Surface Positions	1	17	18c	Full range	0.5	± 2 degrees unless higher accuracy uniquely required or available	0.2% of full range or the resolution required to operate the aircraft	-
4.1.6 Yaw Axis Trim Control Surface Positions	1 (or 5.4.3)	66	66	Full range	2	± 3% unless higher accuracy uniquely required or available	0.3% of full range	-
4.2 Secondary Flight Control Surface Positions	-	-	-	-	-	-	-	-
4.2.1 Trailing Edge Flap Position	1 (or 5.2.1)	20	10a	Full range	2	± 3 degrees	0.5% of full range	-
4.2.2 Leading Edge Flap/ Slat Position	1 (or 5.2.2)	21	11a	Full range	1	± 3 degrees	0.5% of full range	Left and right sides may each be sampled at 2 second intervals so as to give interleaved data points each second.
4.2.3 Wing Sweep Position	1	-	-	Full range				Variable Geometry/Swing Wing Aircraft Only

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
4.2.4 Ground Spoiler Position	1	23	13a	Full range or each discrete position	0.5	± 2% unless higher accuracy uniquely required	0.2% of full range	Sufficient to determine the position of the surfaces
4.2.5 Speedbrake Position	3	87	13c	Full range or each discrete position	0.5	± 2% unless higher accuracy uniquely required	0.2% of full range	Sufficient to determine the position of the surfaces
4.3 Propulsion Thrust Positions	-	-	-	-	-	-	-	-
4.3.1 Thrust reverse status	1	22	12	Turbo-jet = stowed, in transit and reverse Propellor = reverse	Each reverser each second	-	-	Turbo-jet three states can be determined with 2 discretes, Propellor with 1
4.3.2 Nozzle Position/Area	3	-	-	As installed				
4.3.3 Nozzle Rotation Position	3	-	-	As installed				
4.4 Computed Center of Gravity	3	73	55	As installed	64	As installed	1 % Full range	-
4.5 Landing Gear Position	1 (or 5.2.5)	36	32a	Discrete(s)	4 (0.5 recommended)	-	-	A suitable combination of discretes should be recorded to determine in transit, down and lock, up and lock
4.6 Tailhook	4	-	-	As installed				

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
4.7 Stores/Weapon Configuration	3	-	-	As installed				
4.8 External Door/Panel Positions	4	-	-	As installed				
5.0 Crew Control Parameters								
5.1 Primary Control, Cockpit Inputs & Forces	-	88	75	-	1	-	-	-
5.1.1 Control wheel cockpit input forces	1/4	88	75a	± 30 Kgs	1	± 5%	0.2 % of full range or as installed	For fly-by-wire aircraft where control surface position is a function of the displacement of the control input device only it is not necessary to record this parameter.
5.1.2 Control column cockpit input forces	1/4	88	75b	± 40Kgs	1	± 5%	0.2 % of full range or as installed	For fly-by-wire aircraft where control surface position is a function of the displacement of the control input device only it is not necessary to record this parameter.

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
5.1.3 Rudder pedal cockpit input forces	1/4	88	75c	± 75 Kgs	1	± 5%	0.2 % of full range or as installed	For fly-by-wire aircraft where control surface position is a function of the displacement of the control input device only it is not necessary to record this parameter.
5.1.4 Pitch Axis Primary Flight Control Input	1	12	18a	Full range	0.25	± 2 degrees unless higher accuracy uniquely required or available	0.2% of full range or the resolution required to operate the aircraft	For airplanes that have a flight control break away capability that allows either pilot to operate the controls independently, record both control inputs. The control inputs may be sampled alter-nately.
5.1.5 Roll Axis Primary Flight Control Input	1	13	18b	Full range	0.25	± 2 degrees unless higher accuracy uniquely required or available	0.2% of full range or the resolution required to operate the aircraft	For airplanes that have a flight control break away capability that allows either pilot to operate the controls independently, record both control inputs. The control inputs may be sampled alter-nately.

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
5.1.6 Yaw Axis Primary Flight Control Input	1	14	18c	Full range	0.5	± 2 degrees unless higher accuracy uniquely required or available	0.2% of full range or the resolution required to operate the aircraft	For airplanes that have a flight control break away capability that allows either pilot to operate the controls independently, record both control inputs. The control inputs may be sampled alternately.
5.1.7 Thrust/Power Lever Angle	1/4	42	9b & 35f	Full range	Each lever each second	± 2% or sufficient to determine any gated position	2% of full range	Must be recorded for aeroplanes with non-mechanically linked cockpit engine controls, otherwise recommended.
5.1.8 Engine Thrust Command	3	57	53	As installed	2	As installed	2% of full range	-
5.1.9 Engine Thrust Target	3	58	54	As installed	4	As installed	2% Full range	-
5.1.10 Stability Augmentation System Engagement	1	-	15	Discrete	1	-	-	-
5.2 All Secondary Control, Cockpit Inputs & Forces	-	-	-	-	-	-	-	-
5.2.1 Trailing edge flap cockpit control selection	1 (or 4.2.1)	85	10b	Full range or each discrete position	2	sufficient to determine each discrete position	-	-

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
5.2.2 Leading edge flap/slat cockpit control selection	1 (or 4.2.2)	86	11b	Full range or each discrete position	1	sufficient to determine each discrete position	-	-
5.2.3 Speedbrake cockpit selection/lever position	1	87	13d	Full range or each discrete position	0.5	± 2% unless higher accuracy uniquely required	0.2% of full range or discrete	Sufficient to determine the use of the cockpit selector
5.2.4 Ground Spoiler cockpit selection	1	23	13b	Full range or each discrete position	0.5	± 2% unless higher accuracy uniquely required	0.2% of full range or discrete	Sufficient to determine the use of the cockpit selector
5.2.5 Landing Gear Selector Position	1 (or 4.5)	36	32b	Discrete(s)	4 (0.5 recommended)	-	-	A suitable combination of discretes should be recorded to determine position of the gear selector
5.2.6 Left and Right Brake Pedal Position	1	69	34b	Full Range	1	± 5%		To determine braking effort applied by pilots or by autobrakes
5.3 Autopilot/Autothrottle/ AFCS Engagement Status	1	10	15	A suitable combination of discretes	1	-	-	Discretes should show which systems are engaged and controlling the aircraft
5.4 All Cockpit, Primary Control, Trim Input Positions	-	-	-	-	-	-	-	-

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
5.4.1 Pitch Trim Control Input Position	1 (or 4.1.2)	82	72	Full Range	1	± 5%	0.2% of full range	When mechanical means for control inputs are not available cockpit displayed trim positions should be recorded
5.4.2 Roll Trim Control Input Position	1 (or 4.1.4)	83	73	Full Range	1	± 5%	0.2% of full range	When mechanical means for control inputs are not available cockpit displayed trim positions should be recorded
5.4.3 Yaw Trim Control Input Position	1 (or 4.1.6)	84	74	Full Range	1	± 5%	0.2% of full range	When mechanical means for control inputs are not available cockpit displayed trim positions should be recorded
5.5 Propulsion Controls	-	-	-	-	-	-	-	-
5.5.1 Nozzle Rotation Control	3	-	-	As installed				
5.5.2 Afterburner Select	3	-	-	As installed				
5.5.3 Thrust Reverser Select	3	-	-	As installed				
5.5.4 Bleed Air Select	4	-	-	As installed				
5.6 Calibration, Navigation, Performance, and Warning Settings	-	-	-	-	-	-	-	-

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
5.6.1 Selected Altitude (All pilot selectable modes of operation)	2	48	39	As installed	1	As installed	Selectable resolution	To be recorded for aircraft where electronic displays are fitted
5.6.2 Pilot Selected Barometric Setting	2	47	38a	As installed	64	As installed	1 hPa	Where practicable, a sampling interval of 4 seconds is recommended. To be recorded for aircraft where electronic displays are fitted.
5.6.3 First Officer Selected Barometric Setting	2	47	38a	As installed	64	As installed	1 hPa	Where practicable, a sampling interval of 4 seconds is recommended. To be recorded for aircraft where electronic displays are fitted.
5.6.4 Selected Decision Heights (All pilot selectable modes of operation)	2	54	45	As installed	64	As installed	Selectable resolution	To be recorded for aircraft where electronic displays are fitted
5.6.5 Selected Flight Path (All pilot selectable modes of operation)	-	53	-	-	-	-	-	-
5.6.5.1 Course/DSTRK	2	-	44a	As installed	1	As installed	Selectable resolution	To be recorded for aircraft where electronic displays are fitted
5.6.5.2 Path Angle	2	-	44b	As installed	1	As installed	Selectable resolution	To be recorded for aircraft where electronic displays are fitted

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
5.6.5.3 Selected Heading	2	52	43	As installed	1	As installed	Selectable resolution	To be recorded for aircraft where electronic displays are fitted
5.6.6 Selected Frequencies	-	-	-	-	-	-	-	-
5.6.6.1 Navigation Frequencies	1	46	25	Sufficient to determine selected frequencies	4	As installed	-	An offset value or channel counter would be acceptable. The frequency to be recorded should be that associated with the information displayed to the pilot.
5.6.6.2 Communication Frequencies	3	-	-	Sufficient to determine selected frequencies	4	As installed	-	An offset value or channel counter would be acceptable. The frequency to be recorded should be that associated with the communication frequency used by the pilot.
5.6.7 Selected Mach (All pilot selectable modes of operation)	2	50	41	As installed	1	As installed	Selectable resolution	To be recorded for aircraft where electronic displays are fitted
5.6.8 Selected Speed (All pilot selectable modes of operation)	2	49	40	As installed	1	As installed	Selectable resolution	To be recorded for aircraft where electronic displays are fitted
5.6.9 Selected Vertical Speed (All pilot selectable modes of operation)	2	51	42	As installed	1	As installed	Selectable resolution	To be recorded for aircraft where electronic displays are fitted

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
5.7 Subsystem Functional Selection	-	-	-	-	-	-	-	-
5.7.1 De-icing and/or Anti-icing System Select	3	72	69	Discretes	4	-	-	-
5.7.2 Secondary Power System (APU/EPU) Select	3	-	-	Discrete	1	-	-	
5.7.3 Landing Gear Select	3	-	-	Discrete(s)	4	-	-	Down Lock Switch Position or Equivalent
5.8 Ground Spoiler Position/Speed Brake Selection	3	-	-	Discrete	1			
5.9 Ejection Selection/Handle Pull	3	-	-	Discrete	1	-	-	-
6.0 Warnings, Cautions, Advisories, Statusing								
6.1 Warnings, Cautions & Advisories (WCAS)	1	30	24	Discretes	1	-	-	A discrete must be recorded for the master warning. Each 'red' warning should be recorded when the warning condition cannot be determined from other parameters or from the cockpit voice recorder.
6.1.1 Navigation WCAS								

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
6.1.1.1 Ground Proximity Warning System (GPWS) Terrain Alerts, Cautions, Warnings, Advisories, on/ off position, Selection of Terrain Display Mode including pop up display status.	1	35	28	Discretes	1			A suitable combination of discretes to convey status of the system
6.1.1.2 Traffic alerting and Collision Avoidance System	1	44	36	Discretes	1	As installed		A suitable combination of discretes to determine sensitivity level and status of system, Combined Control, Vertical Control, Up Advisory and Down Advisory
6.1.1.3 Windshear Warning	3	41	37	Discrete	1	As installed		
6.1.2 Flight Control WCAS								
6.1.2.1 AFCS Malfunction	3			Discrete(s)	1			
6.1.2.2 SAS/SCAS Failure	3			Discrete	1			
6.1.2.3 Operational Stall Protection, Stick Shaker/ Pusher activation	3	40	59	As installed	1	As installed		A suitable combination of discretes to determine activation
6.1.3 Propulsion WCAS								
6.1.3.1 Vibration Warning, Each Engine	3	62	62	As installed	1	As installed		

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
6.1.3.2 Oil Press Low Warning, Each Engine	3	64	64	As installed	1	As installed		
6.1.3.3 Over Temp Warning, Each Engine	3	63	63	As installed	1	As installed		
6.1.3.4 Overspeed Warning, Each Engine	3	65	65	As installed	1	As installed		
6.1.3.5 Engine Controller Failure	3							
6.1.4 Computer Failure	1	79	52	Discrete(s)	4	As installed		Safety Critical Control Systems
6.1.5 Electrical System WCAS								
6.1.5.1 Converter(s) Fail/ Malfunction	3			Discrete(s)	1			
6.1.5.2 Generator(s) Fail	3			Discrete(s)	1			
6.1.5.3 Inverter	3			Discrete(s)	1			
6.1.5.4 Battery Temp/Failures	4			Discrete(s)	1			
6.1.6 Fuel System WCAS								
6.1.6.1 Low Fuel Warning	3			Discrete(s)	4			
6.1.6.2 Fuel Pump Fail	3			Discrete(s)	1			
6.1.7 Secondary Power (APU/EPU) System Fail	3			Discrete	1			

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
6.1.8 Hydraulic Pressure Low Warning	1	33	30a	Discrete(s) or available sensor range	2	As installed	0.5% of full range	Each essential system to be recorded
6.1.9 Pneumatic Low Pressure Warning	4	33	30b	Discrete(s) or available sensor range	2	As installed	0.5% of full range	Each essential system to be recorded
6.1.10 Crew/Cabin Environment WCAS								
6.1.10.1 Loss of Cabin Pressure Warning	1	78	71	Discrete	1			
6.1.10.2 Oxygen Concentration Low	3			Discrete	4			
6.1.10.3 Oxygen Back Up	3			Discrete	4			
6.1.10.4 Canopy Unlock	4			Discrete	0.5			
6.1.10.5 Seat Ejection/Initiation	3			Discrete	0.1			
6.1.11 Anti Icing System								
6.1.11.1 Anti Ice Fail	4			Discrete				
6.1.11.2 Ice Detection	3	61	61	As installed	4			A suitable combination of discretes to determine the status of each system
6.1.11.3 Ice Rate	4			As installed	1	As installed		
6.1.12 Landing Gear System WCAS								

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
6.1.12.1 Nose Gear Steering Fail	3			Discrete	1			
6.1.12.2 Anti Skid/Brakes Fail/Inop	3			Discrete	1			
6.1.13 Fire Detection & Suppression WCAS								
6.1.13.1 Fire Warning	3			Discrete(s)	1			
6.1.14 Exterior Panel(s) Open/Unlatched	4			Discrete(s)	1			
6.1.15 Launch/Jettison Fail	3			Discrete(s)	1			
6.2 Statusing								
6.2.1 Autopilot/Autothrottle/AFCS mode status	1	25	15	A suitable combination of discretes	1			Discretes should show which systems and modes are engaged and controlling the aircraft
6.2.2 Engine Bleed Valve Position	3	71	50	Discrete(s)	4	As installed		Sufficient discretes should be recorded to determine the configuration of engine bleed valve
6.2.3 Para Visual Display On	3	81	58	As installed	1	As installed		

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
6.2.4 Multi function/ engine/alerts Display Format	2	56	47	Discrete(s)	4	As installed		Discretes should show the display system status (e.g. off, normal, fail) and the identity of display pages for emergency procedures, checklists. Information in checklists and procedures need not be recorded.
6.2.5 Pilot EFIS Display Format	2	55	46a	Discrete(s)	4	As installed		Discretes should show the display system status (e.g. off, normal, fail, composite, sector, plan, rose, nav aids, wxr, range, copy
6.2.6 First Officer EFIS Display Format	2	55	46b	Discrete(s)	4	As installed		Discretes should show the display system status (e.g. off, normal, fail, composite, sector, plan, rose, nav aids, wxr, range, copy
6.2.7 Engine Status/Parameters (see 2.3.1.4)		43	35					
6.2.7.1 Engine Pressure Ratio (EPR)	3		35a	As installed	Each engine each second	As installed	0.1% of full range	

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
6.2.7.2 Fan speed (N1)	3		35b	As installed	Each engine each second	As installed	0.1% of full range	
6.2.7.3 Indicated vibration level	3		35c	As installed	Each engine each second	As installed	0.1% of full range	
6.2.7.4 Core Speed (N2)	3		35d	As installed	Each engine each second	As installed	0.1% of full range	
6.2.7.5 Exhaust Gas Temperature (EGT)	3		35e	As installed	Each engine each second	As installed	0.1% of full range	
6.2.7.6 Fuel Flow	3		35g	As installed	Each engine each second	As installed	0.1% of full range	
6.2.7.7 Fuel Cutoff Lever Position	3		35h	As installed	Each engine each second	As installed	0.1% of full range	
6.2.7.8 Oil Pressure	3			As installed				
6.2.7.9 Oil Temperature	3			As installed				

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
6.2.7.10 Torque	3			As installed				
6.2.7.11 Turbine Inlet Temperature	3			As installed				
6.2.7.12 Chip Lights	3			As installed				
6.2.7.13 Engine Stall	3			As installed				
6.2.7.14 Fuel Pressure	3			As installed				
6.2.8 Navigation System Status								
6.2.8.1 Vertical Beam Deviation	1	28	21					
6.2.8.1.1 ILS/GPS Glidepath	1a		21a	± 0.22 DDM or available sensor range as installed	1	As installed. ± 3% recommended	0.3% of full range	For autoland/category 3 operations, each system should be recorded but arranged so that at least one is recorded each second.
6.2.8.1.2 MLS Elevation	1b		21b	+0.9 to +30 degrees	1	As installed. ± 3% recommended	0.3% of full range	For autoland/category 3 operations, each system should be recorded but arranged so that at least one is recorded each second.
6.2.8.2 Horizontal Beam Deviation	1	27	22					

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
6.2.8.2.1 ILS/GPS Localizer	1a		22a	± 0.22 DDM or available sensor range as installed	1	As installed. ± 3% recommended	0.3% of full range	For autoland/category 3 operations, each system should be recorded but arranged so that at least one is recorded each second.
6.2.8.2.2 MLS Azimuth	1b		22b	± 62 degrees	1	As installed. ± 3% recommended	0.3% of full range	For autoland/category 3 operations, each system should be recorded but arranged so that at least one is recorded each second.
6.2.8.2.3 TACAN (Channel, Bearing, Range)	3							
6.2.8.3 Primary Navigation System Reference (ex: GPS, INS, VOR/DME, MLS, Loran C, Localizer Glideslope)	1	60	60	As installed	4	As installed		A suitable combination of discretes to determine the Primary Navigation System reference if more than one system is available
6.2.8.4 Marker Beacon Passage	1	29	23	Discrete(s)	1			A single discrete is acceptable for all markers
6.2.8.5 DME 1 and 2 Distance	1	45	26	0 200 NM	4	As installed	1 NM	
6.2.9 Electrical Subsystem Status								

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
6.2.9.1 AC Electrical Bus Status	1	74	48	Discrete(s)	4	As installed		Each bus
6.2.9.2 DC Electrical Bus Status	1	75	49	Discrete(s)	4	As installed		Each bus
6.2.10 Fuel System Status								
6.2.10.1 Fuel Quantity								
6.2.10.1.1 Each Tank Quantity	1		56	As installed	4	As installed	1% of full range	
6.2.10.1.2 Total Fuel Quantity	3			As installed	64	As installed	1% of full range	
6.2.10.2 Fuel Flow	3			As installed				
6.2.10.3 Fuel Transfer	3			As installed				
6.2.10.4 Fuel Boost	3			As installed				
6.2.10.5 Fuel Filter/Bypass	3			As installed				
6.2.10.6 Inflight Refueling Probe	4			As installed				
6.2.10.7 Inflight Refueling Engage	4			As installed				
6.2.10.8 Fuel Dump Switch Position	4			As installed				
6.2.10.9 Fuel Dump Valve Position	4			As installed				
6.2.11 Hydraulic Pressure, Each System	1	77	70	Full range	2	± 5%	100 psi	

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
6.2.12 APU Bleed Valve Position	3	76	51	Discrete(s)	4	As installed		
6.2.13 HUD Statusing								
6.2.13.1 HUD Display Parameters	4							
6.2.13.2 Head Up Display in use	1	80	57	As installed	4	As installed		
6.2.14 Cabin Pressure	4							
6.2.15 Landing System Status								
6.2.15.1 Air/Ground Status & each landing gear WOW as installed	1	31	27	Discrete(s)	1 (0.25 recommended)			
6.2.15.2 Left and Right Brake Pressure	1	68	34a	Maximum brake system pressure range	1	± 5%		To determine braking effort applied by pilots or by autobrakes
6.2.15.3 Parking Brake On	4			Discrete	2			
6.2.15.4 Wheel Speed	4							
6.2.16 Strain Gauges	4			As installed				

Table 2. Rotary Wing Aircraft Parameters.

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
1.0 Recorder, System or Mission Parameters								
1.1 CVR/DFDR Synchronization Reference	1		8					
1.2 Microphone/Transmitter Keying	1		8	Discrete(s)	1			Preferably each crew member but one discrete acceptable for all transmissions provided the CVR/FDR system complies with 1.1 of this table
1.3 Data Time Tag reference								
1.3.1 Recorder Elapsed Time	1c							
1.3.2 Relative Time Count	1b		1b	0 to 4095	4	± 0.125% per hour	1 second	Counter increments each 4 seconds of system operation
1.3.3 UTC	1a		1a	24 hours	4	± 0.125% per hour	1 second	Preferred
1.4 Event Marker	1			Discrete	1			Cockpit Switch
1.5 Date	3			366 Days	Power On		1 Day	UTC Time Preferred Where Available
1.6 Aircraft Number	3			As Installed	Power On			

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
1.7 Departure Base	4			As Installed	Power On			
1.8 Aircraft Weight	4			As Installed	Power On			
2.0 Aircraft Dynamics								
2.1 Velocity								
2.1.1 Indicated Airspeed (KIAS)	1		3	Minimum value from installed pitot static system to 1.2 VNE	1	± 5%	1 kt	Should be obtained from the air data computer where installed
2.1.2 Calibrated Airspeed (KCAS)	4			Minimum value from installed pitot static system to 1.2 VNE	1	± 3%	1 kt	Should be obtained from the air data computer where installed
2.1.3 Groundspeed	4			As installed	1	Data should be obtained from the most accurate system	1 kt	
2.1.4 Yaw Rate	1		18	±400°/Sec	0.25	±1%	2°/Sec	An equivalent yaw acceleration is an acceptable alternative
2.1.5 Altitude Rate (VVI)	3		34	As installed	1	As installed		
2.2 Attitude								
2.2.1 Pitch Attitude	1		6	± 90 degrees	0.5	± 2 degrees	0.5 degree	Accuracy will apply within ± 75° range
2.2.2 Roll Attitude	1		7	± 180 degrees	0.5	± 2 degrees	0.5 degree	
2.3 Accelerations								

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
2.3.1 Linear Accelerations								
2.3.1.1 Vertical/Normal Acceleration	1		5	3G to +9G	0.125	± 1% of specified range excluding a datum error of ± 5% of specified range	0.004G	
2.3.1.2 Lateral Acceleration	1		21	± 1G	0.25	± 1.5% of specified range excluding datum error of ± 5% of specified range	0.004G	
2.3.1.3 Longitudinal Acceleration	1		20	± 1G	0.25	± 1.5% of specified range excluding datum error of ± 5% of specified range	0.004G	
2.3.1.4 Power of Each Engine	1 (6.2.7)		9	Full Range	Each engine each second	As installed	0.1 % of full range	Sufficient parameters appropriate to the particular engine must be recorded to determine power. A margin for possible overspeed should be provided.

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
2.3.2 Angular Accelerations								
2.3.2.1 Pitch Acceleration	4							
2.3.2.2 Roll Acceleration	4							
2.3.2.3 Yaw Acceleration	4		18					see 2.1.4
2.4 Main Rotor Speed	1		10a	50 130%	0.5	2%	0.3% of full range	
3.0 Aircraft Environment								
3.1 Altitude								
3.1.1 Pressure Altitude	1		2	1000 to maximum certified altitude of aircraft +5000 ft	1	± 100 ft to ± 700 ft	5 ft	
3.1.2 Radio/Radar Altitude	3		22	20 ft to +2500 ft	1	± 2 ft or ± 3% whichever is greater below 500 ft and ±5% above 500 ft recommended	1 ft below 500 ft, 1 ft + 0.5% of full range above 500 ft	Radio altitude can go negative depending on aircraft attitude and sensor calibration
3.1.3 GPS Altitude	4							
3.2 Geodetic Position (Lat/Long)	3		29d	As installed	1	Data should be obtained from the most accurate system as installed	0.002 degree	Where capacity permits, latitude/longitude resolution should be 0.0002 degree

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
3.3 Heading (Primary Crew Reference)	1		4	0 360° and discrete 'true' or 'mag'	1	± 2 degrees	0.5 degrees	When true or magnetic heading can be selected as the primary heading reference, a discrete indicating the selection must also be recorded
3.4 Airflow								
3.4.1 WindDirection	3		29c	As installed	4	Data should be obtained from the most accurate system as installed	1 degree	
3.4.2 Wind Speed	3		29b	As installed	4	Data should be obtained from the most accurate system as installed	1 knot	
3.4.3 Drift Angle	3		29a	As installed	4	Data should be obtained from the most accurate system as installed	0.1 degree	
3.5 Temperature	1							
3.5.1 Outside Air Temperature	1b		13	50°C to +90°C or available sensor range	2	± 2°C	0.3°C	

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
3.5.2 Total Air Temperature	1a			50°C to +90°C or available sensor range	2	± 2°C	0.3°C	
4.0 Aircraft Aerodynamic Configuration								
4.1 Primary Control Configurations								
4.1.1 Collective Pitch Position	1		11a	Full range	0.5	± 3% unless higher accuracy is uniquely required	0.5% of Operating Range	
4.1.2 Longitudinal Cyclic Pitch Position	1		11b	Full range	0.5	± 3% unless higher accuracy is uniquely required	0.5% of Operating Range	
4.1.3 Lateral Cyclic Pitch Position	1		11c	Full range	0.5	± 3% unless higher accuracy is uniquely required	0.5% of Operating Range	
4.1.4 Tail Rotor Pitch Position	1		11d	Full range	0.5	± 3% unless higher accuracy is uniquely required	0.5% of Operating Range	

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
4.1.5 Controllable Stabilator Position	1		11e	Full range	0.5	± 3% unless higher accuracy is uniquely required	0.5% of Operating Range	
4.1.6 Hydraulic System Active	1		11f	Discrete	1			
4.2 Computed Center of Gravity	3			As installed	64	As installed	1 % Full range	
4.3 Landing Gear Position	3		30	Discrete(s)	4			A suitable combination of discretes should be recorded to determine in transit, down and lock, up and lock
5.0 Crew Control Parameters								
5.1 Primary Flight Control Inputs								
5.1.1 Collective Pitch Input	1		11a	Full Range	0.5	± 3% unless higher accuracy is uniquely required	0.5% of Operating Range	

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
5.1.2 Longitudinal Cyclic Pitch Input	1		11b	Full Range	0.5	± 3% unless higher accuracy is uniquely required	0.5% of Operating Range	
5.1.3 Lateral Cyclic Pitch Input	1		11c	Full Range	0.5	± 3% unless higher accuracy is uniquely required	0.5% of Operating Range	
5.1.4 Tail Rotor Pitch/ Pedal Input	1		11d	Full Range	0.5	± 3% unless higher accuracy is uniquely required	0.5% of Operating Range	
5.1.5 Controllable Stabilator Input	1		11e	Full Range	0.5	± 3% unless higher accuracy is uniquely required	0.5% of Operating Range	
5.1.6 Hydraulic System Selected	1		11f	Discrete(s)	1			
5.2 Rotor Brake	3		10b	Discrete	1			
5.3 Autopilot/Autothrottle/ AFCS Engagement Status	1			A suitable combination of discretes	1			Discretes should show which systems are engaged and controlling the aircraft

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
5.4 All Cockpit, Primary Control, Trim Input Positions								
5.4.1 Collective Trim Position	1			Full Range	1	± 5%	0.2% of full range	When mechanical means for control inputs are not available cockpit display trim positions should be recorded
5.4.2 Longitudinal Cyclic Trim Position	1			Full Range	1	± 5%	0.2% of full range	When mechanical means for control inputs are not available cockpit display trim positions should be recorded
5.4.3 Lateral Cyclic Trim Position	1			Full Range	1	± 5%	0.2% of full range	When mechanical means for control inputs are not available cockpit display trim positions should be recorded
5.5 Propulsion Controls								
5.5.1 Bleed Air Select	4							
5.5.2 Throttle Setting	3							
5.6 Calibration, Navigation, Performance, and Warning Settings								

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
5.6.1 Selected Altitude (All pilot selectable modes of operation)	2			As installed	1	As installed	Selectable resolution	To be recorded for aircraft where electronic displays are fitted
5.6.2 Pilot Selected Barometric Setting	2			As installed	64	As installed	1 hPa	Where practicable, a sampling interval of 4 seconds is recommended. To be recorded for aircraft where electronic displays are fitted.
5.6.3 First Officer Selected Barometric Setting	2			As installed	64	As installed	1 hPa	Where practicable, a sampling interval of 4 seconds is recommended. To be recorded for aircraft where electronic displays are fitted.
5.6.4 Selected Decision Heights (All pilot selectable modes of operation)	2			As installed	64	As installed	Selectable resolution	To be recorded for aircraft where electronic displays are fitted
5.6.5 Selected Flight Path (All pilot selectable modes of operation)								
5.6.5.1 Course/DSTRK	2			As installed	1	As installed	Selectable resolution	To be recorded for aircraft where electronic displays are fitted
5.6.5.2 Path Angle	2			As installed	1	As installed	Selectable resolution	To be recorded for aircraft where electronic displays are fitted

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
5.6.5.3 Selected Heading (All pilot selectable modes of operation)	2			As installed	1	As installed	Selectable resolution	To be recorded for aircraft where electronic displays are fitted
5.6.6 Each Navigation Frequency Selected	1		27	Sufficient to determine selected frequency	4	As installed		An offset value or channel counter would be acceptable. The frequency to be recorded should be that associated with the information displayed to the pilot.
5.6.7 Selected Mach (All pilot selectable modes of operation)	2			As installed	1	As installed	Selectable resolution	To be recorded for aircraft where electronic displays are fitted
5.6.8 Selected Speed (All pilot selectable modes of operation)	2			As installed	1	As installed	Selectable resolution	To be recorded for aircraft where electronic displays are fitted
5.6.9 Selected Vertical Speed (All pilot selectable modes of operation)	2			As installed	1	As installed	Selectable resolution	To be recorded for aircraft where electronic displays are fitted
5.7 Subsystem Functional Selection								
5.7.1 De icing and/or Anti icing System Select	3			Discretes	4			
5.7.2 Secondary Power System (APU/EPU) Select	3			Discrete	1			
5.7.3 Landing Gear Select	3		30	Discrete	4			

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
6.0 Warnings, Cautions, Advisories, Statusing								
6.1 Warnings, Cautions & Advisories (WCAS)	1		26	Discretes	1			A discrete must be recorded for the master warning. Each 'red' warning should be recorded when the warning condition cannot be determined from other parameters or from the cockpit voice recorder.
6.1.1 Navigation WCAS								
6.1.1.1 Ground Proximity Warning System (GPWS) Terrain Alerts, Cautions, Warnings, Advisories, on/off position, Selection of Terrain Display Mode including pop up display status.	1			Discrete(s)	1			A suitable combination of discretes to convey status of the system
6.1.1.2 Traffic alerting and Collision Avoidance System	1			Discretes	1	As installed		A suitable combination of discretes to determine sensitivity level and status of system, Combined Control, Vertical Control, Up Advisory and Down Advisory

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
6.1.1.3 Windshear Warning	3			Discrete	1	As installed		
6.1.2 Flight Control WCAS								
6.1.2.1 AFCS Malfunction	3			Discrete	1			
6.1.2.2 SAS/SCAS Failure	1			Discrete	1			
6.1.2.3 Operational Stall Protection, Stick Shaker/ Pusher activation	3			As installed	1	As installed		A suitable combination of discretes to determine activation
6.1.3 Propulsion WCAS	*		35d					
6.1.3.1 Vibration Warning, Each Engine	3		35d	As installed	1	As installed		
6.1.3.2 Oil Press Low Warning, Each Engine	3		35d	As installed	1	As installed		
6.1.3.3 Over Temp Warning, Each Engine	3		35d	As installed	1	As installed		
6.1.3.4 Overspeed Warning, Each Engine	3		35d	As installed	1	As installed		
6.1.4 Computer Failure	1			Discrete(s)	4	As installed		Safety Critical Control Systems
6.1.5 Electrical System WCAS								
6.1.5.1 Converter(s) Fail/ Malfunction	3			Discrete(s)	1			
6.1.5.2 Generator(s) Fail	3			Discrete(s)	1			

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
6.1.5.3 Inverter	3			Discrete(s)	1			
6.1.5.4 Battery Temp/Failures	4			Discrete(s)	1			
6.1.6 Fuel System WCAS								
6.1.6.1 Low Fuel Warning	3			Discrete	4			
6.1.6.2 Fuel Pump Fail	3			Discrete(s)	1			
6.1.7 Secondary Power (APU/EPU) System Fail	3			Discrete	1			
6.1.8 Hydraulic Pressure Low Warning	1			Discrete(s)	1			Each essential system to be recorded
6.1.9 Pneumatic Low Pressure Warning	4			Discrete(s) or available sensor range	2	As installed	0.5% of full range	Each essential system to be recorded
6.1.10 Crew/Cabin Environment WCAS								
6.1.10.1 Loss of Cabin Pressure Warning	1			Discrete	1			
6.1.10.2 Oxygen Concentration Low	3			Discrete	4			
6.1.10.3 Oxygen Back Up	3			Discrete	4			
6.1.10.4 Canopy Unlock	4			Discrete	0.5			
6.1.10.5 Seat Ejection	3			Discrete	0.5			
6.1.11 Anti Icing System								
6.1.11.1 Anti Ice Fail	4			Discrete	4			

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
6.1.11.2 Ice Detection	3		35	As installed	1	As Installed		A suitable combination of discretes to determine the status of each system
6.1.11.3 Ice Rate	4			As installed	1	As Installed		
6.1.12 Landing Gear System WCAS								
6.1.12.1 Nose Gear Steering Fail	3			Discrete	1			
6.1.12.2 Anti Skid/Brakes	3			Discrete	1			
6.1.13 Fire Detection & Suppression WCAS								
6.1.13.1 Fire Warning	3			Discrete(s)	1			
6.1.14 Exterior Panel(s) Open/Unlatched	4			Discrete(s)	1			
6.1.15 Launch/Jettison Fail	3			Discrete	1			
6.1.16 Gearbox Low Oil Pressure Warning	1		26	Discrete	1			
6.1.17 Rotor RPM Low	3			Discrete	1			
6.1.18 Transmission(s) Oil Pressure	3			Discrete	1			
6.1.19 Transmission Oil Bypass	3			Discrete	1			
6.1.20 Intermediate Gearbox Overtemp	3			Discrete	1			

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
6.1.21 Tail Rotor Gearbox Overtemp	3			Discrete	1			
6.2 Statusing								
6.2.1 Autopilot/Autothrottle/AFCS mode status	1			A suitable combination of discretes	1			Discretes should show which systems and modes are engaged and controlling the aircraft
6.2.2 Engine Bleed Valve Position	3			Discrete(s)	4	As installed		Sufficient discretes should be recorded to determine the configuration of engine bleed valve
6.2.3 Para Visual Display On	3			As installed	1	As installed		
6.2.4 Multi function/ engine/alerts Display Format	2			Discrete(s)	4	As installed		Discretes should show the display system status (e.g. off, normal, fail) and the identity of display pages for emergency procedures, checklists. Information in checklists and procedures need not be recorded.

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
6.2.5 Pilot EFIS Display Format	2			Discrete(s)	4	As installed		Discretes should show the display system status (e.g. off, normal, fail, composite, sector, plan, rose, nav aids, wxr, range, copy
6.2.6 First Officer EFIS Display Format	2			Discrete(s)	4	As installed		Discretes should show the display system status (e.g. off, normal, fail, composite, sector, plan, rose, nav aids, wxr, range, copy
6.2.7 Engine Status/ Parameters								
6.2.7.1 Engine Pressure Ratio (EPR)	3			As installed	Each engine each second	As installed	0.1% of full range	
6.2.7.2 Gas Generator Speed (NG/N1)	3		9c	As installed	Each engine each second	As installed	0.1% of full range	
6.2.7.3 Indicated vibration level	3			As installed	Each engine each second	As installed	0.1% of full range	
6.2.7.4 Power Turbine Speed (NP/N2)	3		9a	As installed	Each engine each second	As installed	0.1% of full range	
6.2.7.5 Exhaust Gas Temperature (EGT)	3		31	As installed	4	As installed		
6.2.7.6 Fuel Flow	3			As installed	Each engine each second	As installed	0.1% of full range	

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
6.2.7.7 Fuel Cutoff Lever Position	3			As installed	Each engine each second	As installed	0.1% of full range	
6.2.7.8 Oil Pressure	3							
6.2.7.9 Oil Temperature	3							
6.2.7.10 Torque	1		9b	Full range	Each engine each second	As installed	0.1% of full range	
6.2.7.11 Turbine Inlet Temperature	3		32	As installed	4			
6.2.7.12 Chip Detector/ Lights	3		35b					
6.2.7.13 Engine Stall	3							
6.2.7.14 Fuel Pressure	3							
6.2.8 Navigation System Status								
6.2.8.1 Vertical Beam Deviation	1							
6.2.8.1.1 ILS/GPS Glide-path	1a		23a	± 0.22 DDM or available sensor range as installed	1	As installed. ± 3% recom-mended	0.3% of full range	It is not intended for both ILS and MLS data be recorded at the same time, only the aid in use at the time.

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
6.2.8.1.2 MLS Elevation	1b		23b	+0.9 to +30 degrees	1	As installed. ± 3% recommended	0.3% of full range	It is not intended for both ILS and MLS data be recorded at the same time, only the aid in use at the time.
6.2.8.2 Horizontal Beam Deviation	1							
6.2.8.2.1 ILS/GPS Localizer	1a		24a	± 0.22 DDM or available sensor range as installed	1	As installed. ± 3% recommended	0.3% of full range	It is not intended for both ILS and MLS data be recorded at the same time, only the aid in use at the time.
6.2.8.2.2 MLS Azimuth	1b		24b	± 62 degrees	1	As installed. ± 3% recommended	0.3% of full range	It is not intended for both ILS and MLS data be recorded at the same time, only the aid in use at the time.
6.2.8.2.3 TACAN (Channel, Bearing, Range)	3							
6.2.8.3 Primary Navigation System Reference (ex: GPS, INS, VOR/DME, MLS, Loran C, Localizer Glideslope)	1			As installed	4	As installed		A suitable combination of discretes to determine the Primary Navigation System reference if more than one system is available

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
6.2.8.4 Marker Beacon Passage	1		25	Discrete	1			A single discrete is acceptable for all markers
6.2.8.5 DME 1 and 2 Distance	1		28	0 200 NM	4	As installed	1 NM	A sampling interval of 64 seconds is acceptable where other navigation parameters are recorded
6.2.9 Electrical Subsystem Status								
6.2.9.1 AC Electrical Bus Status	1			Discrete(s)	4	As installed		Each bus
6.2.9.2 DC Electrical Bus Status	1			Discrete(s)	4	As installed		Each bus
6.2.10 Fuel System Status								
6.2.10.1 Fuel Quantity			33					
6.2.10.1.1 Each Tank Quantity	1			As installed	4	As installed	1% of full range	
6.2.10.1.2 Total Fuel Quantity	3			As installed	64	As installed	1% of full range	
6.2.10.2 Fuel Flow	3							
6.2.10.3 Fuel Transfer	3							
6.2.10.4 Fuel Boost	3							
6.2.10.5 Fuel Filter/ Bypass	3							

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
6.2.10.6 Inflight Refueling Probe	4							
6.2.10.7 Inflight Refueling Engage	4			Discrete	1			
6.2.11 Hydraulic Pressure, Each System	1			Full range	2	± 5%	100 psi	
6.2.12 APU Bleed Valve Position	3			Discrete(s)	4	As installed		
6.2.13 HUD Statusing								
6.2.13.1 HUD Display Parameters	4							
6.2.13.2 Head Up Display in use	1			As installed	4	As installed		
6.2.14 Main Gearbox Oil Pressure	3			As installed	1	As installed	6.895kN/m2 (1 psi)	
6.2.15 Gearbox Oil Temperatures								
6.2.15.1 Main Gearbox Oil Temperatures	3			As installed	2	As installed	1° C	
6.2.15.2 Intermediarie Gearbox Oil Temperature	3			As installed	2	As installed	1° C	
6.2.15.3 Tail Rotor Gearbox Oil Temperature	3			As installed	2	As installed	1° C	
6.2.16 Cabin Pressure	4			As installed	1	As installed		

	Category	FAR #	WG-50 #	Range	Interval (secs)	Limits	Resolution	Remarks
6.2.17 Indicated Sling Load Force	3		19	0 200% of maximum certified load	0.5	± 3% of maximum certified load	± 0.5% of maximum certified load	
6.2.18 Landing System Status								
6.2.18.1 Air/Ground Status & each landing gear WOW as installed	1			Discrete(s)	1 (0.25 recommended)			
6.2.18.2 Left and Right Brake Pressure	1			Maximum brake system pressure range	1	± 5%		To determine braking effort applied by pilots or by autobrakes
6.2.18.3 Parking Brake On	4			Discrete	2			

LAWRENCE J. DELANEY
Assistant Secretary of the Air Force
for Acquisition

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

AFH 63-1402, ***Aircraft Information Program***

AFPD 63-14, ***Aircraft Information Programs***

AFI 63-1401, ***Aircraft Information Program***

AFI 63-1201, ***Assurance of Operational Safety, Suitability, and Effectiveness***

Acronymns and Abbreviations

AFMC—*Air Force Material Command*

AFSC—*Air Force Safety Center*

AIMP—*Aircraft Information Management Plan*

AIP—*Aircraft Information Program*

AIWG—*Aircraft Information Working Group*

ANG—*Air National Guard*

NASA—*National Aeronautics & Space Administration*